

Historic, Archive Document

Do not assume content reflects current scientific knowledge, policies, or practices.

60.19
-762
0.2



RANGE IMPROVEMENT



U. S. DEPT. OF AGRICULTURE
NATIONAL FOREST LIBRARY
RECEIVED

APR 7 1972

PROCUREMENT SECTION
CURRENT SERIAL RECORDS

VOL. 17, NO. 1

NOTES

JAN. 1972

INDEX

Pipeline Control Box	1
Information Concerning Sagebrush Stand Density and Its Effect On Sage Grouse Habitat	3

FOREST SERVICE — U. S. DEPARTMENT OF AGRICULTURE
INTERMOUNTAIN REGION — OGDEN, UTAH

STATEMENT OF PURPOSE

- - - - -

This publication is printed primarily to inform professional range administrators of important range improvement and management developments and findings. These "NOTES" may include extracts of published papers, unpublished preliminary reports of research work, unpublished reports on administrative studies and personal observations or suggestions of other range administrators. No claim is made as to the accuracy or completeness of studies or conclusions drawn.

All who read these RANGE IMPROVEMENT NOTES are encouraged to submit material for publication, or suggestions for improving its usefulness. Full credit will be given for any material used.



PIPELINE CONTROL BOX

By
Frank Jensen*

Each year many miles of pipeline are installed on rangelands. Often these lines are several miles in length and have a series of connected water troughs.

Several methods are presently used to connect troughs to the main line and to control waterflow through the system. Float valves and taps are often used. Also, water is sometimes fed into one trough and out an overflow to the next. Maintenance is often a problem on many of these systems.

The Cedar City District Bureau of Land Management has developed a simple trouble free control box to use on multi-trough lines where a continuous flow of water is available. Some advantages in using this system are:

1. There are no mechanical parts to fail.
2. All parts are available locally.
3. The control box is adaptable to any type of trough.
4. The unused water, at the end of the line, can be piped to a storage pond for livestock and/or wildlife.
5. Should the livestock concentrate at a specific trough, all flow will be diverted to that trough.
6. The control box is sturdy enough to withstand cattle disturbances around it.

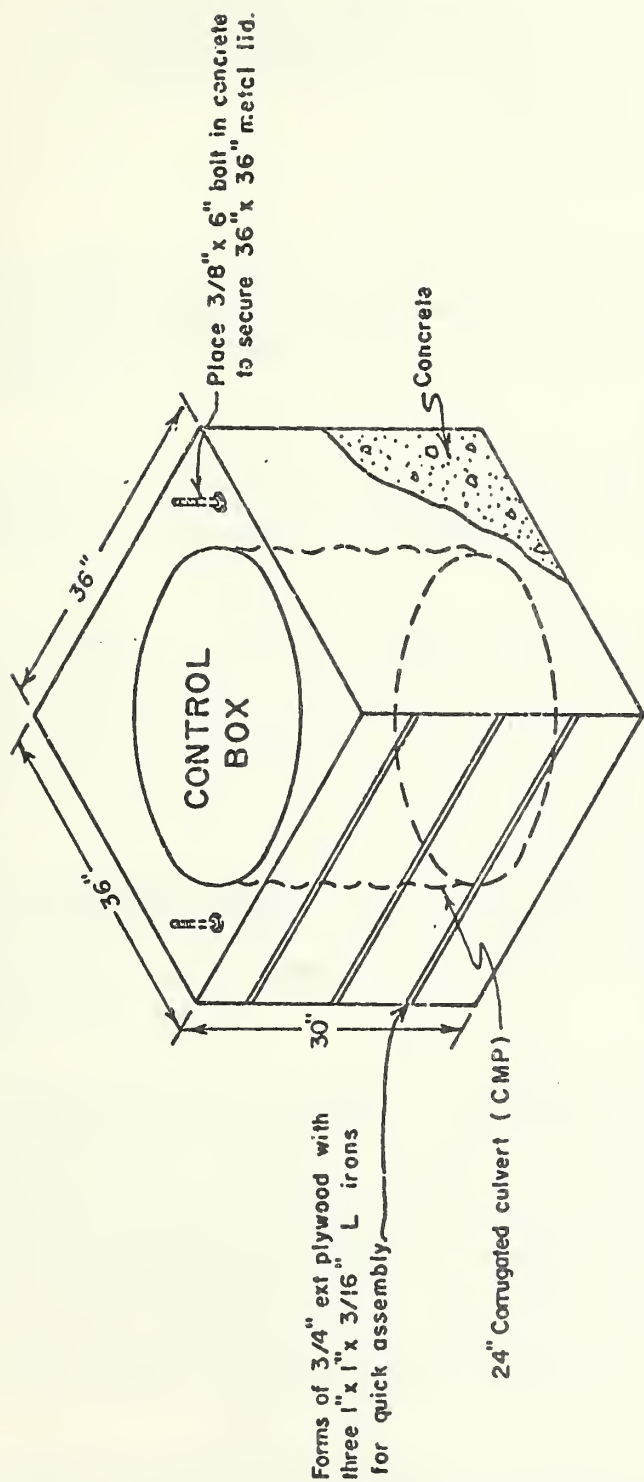
Some limitations in using this system are:

1. Each control box breaks the flow pressure, therefore, the system won't work on level or uphill terrain where the head must be retained.
2. Since a continuous flow of water moves through the system, storage tanks (other than the troughs) cannot be used.
3. Lateral lines can't be used unless gate valves are installed to regulate the flow on both the main line and the lateral.

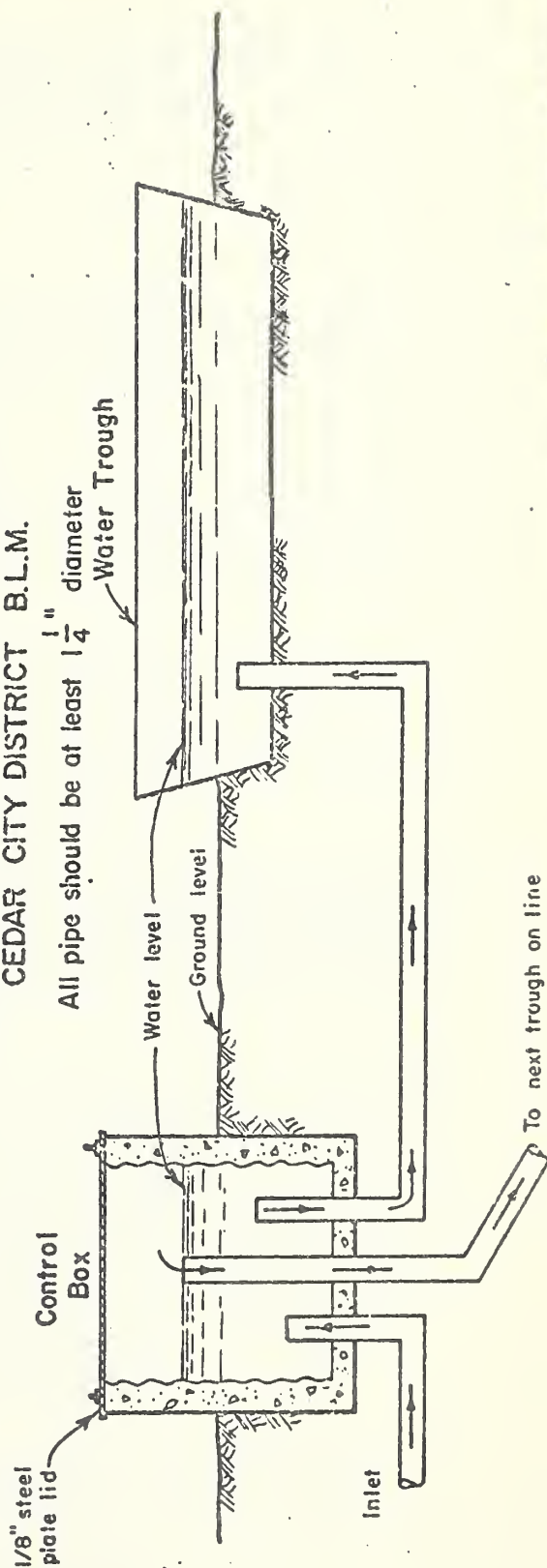
The following diagram shows how the system is constructed.

*Chief, Branch of Range Management, Dixie National Forest - Cedar City, Utah.





TROUGH AND CONTROL BOX AS USED BY CEDAR CITY DISTRICT B.L.M.





INFORMATION CONCERNING SAGEBRUSH STAND DENSITY
AND ITS EFFECT ON SAGE GROUSE HABITAT

By
T. A. Phillips*

- - - - -

During the fall of 1967 considerable time was spent gathering information concerning sagebrush stand density and its effect on sage grouse habitat from various sagebrush sites on the Sawtooth and Humboldt National Forests.

Forty-one sites were sampled. Data collected consisted of estimates of sagebrush canopy overstory and the number of sagebrush plants per acre. Sampling was done with 10-square-foot circular plots, and 20 plots were used in sampling each site.

All sagebrush plants exceeding six inches in height were counted on each plot and an estimate of sagebrush canopy overstory was made. Sagebrush plants less than six inches tall were not counted because these were too small to provide cover for sage grouse. Canopy estimates were based on the percentage of each plot covered by sagebrush overstory.

Of the 40 sites sampled, five were low sagebrush types (Artemisia arbuscula and Artemisia nova), 33 were big sagebrush types (Artemisia tridentata), and two were mixed. The sites were selected to include various slopes, elevations, exposures, and soil types. The data from the 40 sites is presented in Table 1.

In the big sagebrush type, the number of plants per acre ranged from 653 to 8494 and averaged 4523. Percentage overstory ranged from 4 to 28 percent and averaged 17 percent. In the low sagebrush type the number of plants per acre ranged from 8267 to 15,000 and averaged 11,144. Percentage overstory ranged from 16 to 24 percent and averaged 20 percent. The low sagebrush type produced nearly two-and-one-half times as many sagebrush plants per acre but only three percent more overstory. The important point is that both types are capable of producing enough overstory to meet the cover requirements for sage grouse.

*Range Conservationist, Sawtooth National Forest, Twin Falls, Idaho.

Editor's Note: Canopy overstory of sagebrush was made by closing crown of plant eliminating voids in the crown circumference.



Table 1. Number of sagebrush plants per acre and percent canopy overstory on 40 sagebrush sites on the Sawtooth and Humboldt National Forests.

Site No.	No. Plants Per Acre	Overstory Percent	Site No.	No. Plants Per Acre	Overstory Percent
Big Sagebrush Type					
2	3267	14	20	3267	12
3	1089	6	21	653	5
4	2700	18	22	4138	22
5	8494	28	23	3900	17
6	7623	25	24	4356	18
7	4365	16	25	3700	22
8	7187	20	26	3485	22
9	6534	21	27	7841	25
10	3485	16	28	8060	20
11	4574	25	29	2831	18
12	3920	16	30	3267	18
13	1089	5	31	3267	16
14	1960	9	32	6534	22
15	3700	16	34	7187	20
16	5227	16	35	3703	18
17	6752	14	36	8930	19
18	3920	18	37	<u>6752</u>	<u>26</u>
19	1089	4			
Average				4523	17
Low Sagebrush Type					
1	11,326	22	39	10,890	21
33	10,237	16	40	<u>15,000</u>	<u>24</u>
38	8,267	15			
Average				11,144	20

The distribution of sites based on number of plants per acre is shown in Table 2.

Table 2. Distribution of big sagebrush sites according to number of plants per acre.

No. Plants Per Acre	No. of Sites	Percent of Total Sites
0 - 1000	1	3
1001 - 2000	4	11
2001 - 3000	2	6
3001 - 4000	12	33
4001 - 5000	4	11
5001 - 6000	1	3
6001 - 7000	4	11
7001 - 8000	4	11
8001 - 9000	4	11
9001 -10000	<u>0</u>	<u>0</u>
	36	100



The table shows that one-third of the sites produce between 3000 and 4000 plants per acre and that roughly half the sites produce fewer than 4000 plants per acre and half produce more than 4000 plants per acre.

The distribution of sites based on percent overstory is shown in Table 3.

Table 3. Distribution of big sagebrush sites by overstory classes.

<u>Overstory Percent</u>	<u>No. of Sites</u>	<u>Percent of Total Sites</u>
0 - 5	3	8
6 - 10	2	6
11 - 15	4	11
16 - 20	17	47
21 - 25	8	22
26 - 30	2	6
	<u>36</u>	<u>100</u>

Table 3 shows that overstory ranged between 10 and 25 percent on 80 percent of the sites sampled, and on nearly half of the sites overstory ranged between 15 and 20 percent. A comparison of Table 2 and Table 3 indicates that percent overstory follows a much more normal distribution than does number of plants per acre.

There was only fair correlation between number of plants and percent overstory ($r=0.58$). The data for the big sagebrush type are plotted on Figure 1. The graph indicates there is considerable spread in overstory for any given number of sagebrush plants per acre. Also, the spread tends to widen as the number of plants per acre increases. Figure 1 also shows that the relationship between number of plants per acre and overstory is curved rather than linear, with overstory increasing rapidly up to about 3000 plants per acre, then leveling off beyond that point. The curve can be used to obtain a rough estimate of overstory or number of plants per acre if one of the two factors is known. For example, if overstory is estimated at 15 percent, then, from the curve, 3000 plants per acre are indicated. On the other hand, if stand density is estimated at 9500 plants per acre, indicated overstory is 25 percent.

Several site situations that might be of use in classifying sage grouse habitat were noted during the study. These were:

1. Decadent stands with large plants and large open, or broken crowns. Generally, numerous young plants invading - Sites 7, 15, 16, and 36.
2. Mixed stands of sagebrush with bitterbrush, yellowbrush, snowberry, etc., Sites 9, 13, and 23.



FIGURE 1

SAGEBRUSH CANOPY OVERSTORY AND NUMBER OF SAGEBRUSH PLANTS PER ACRE OVER SIX INCHES TALL

Sagebrush
Overstory
%

$\bar{X} = 4523$ plants per acre

$\bar{Y} = 17.4\%$

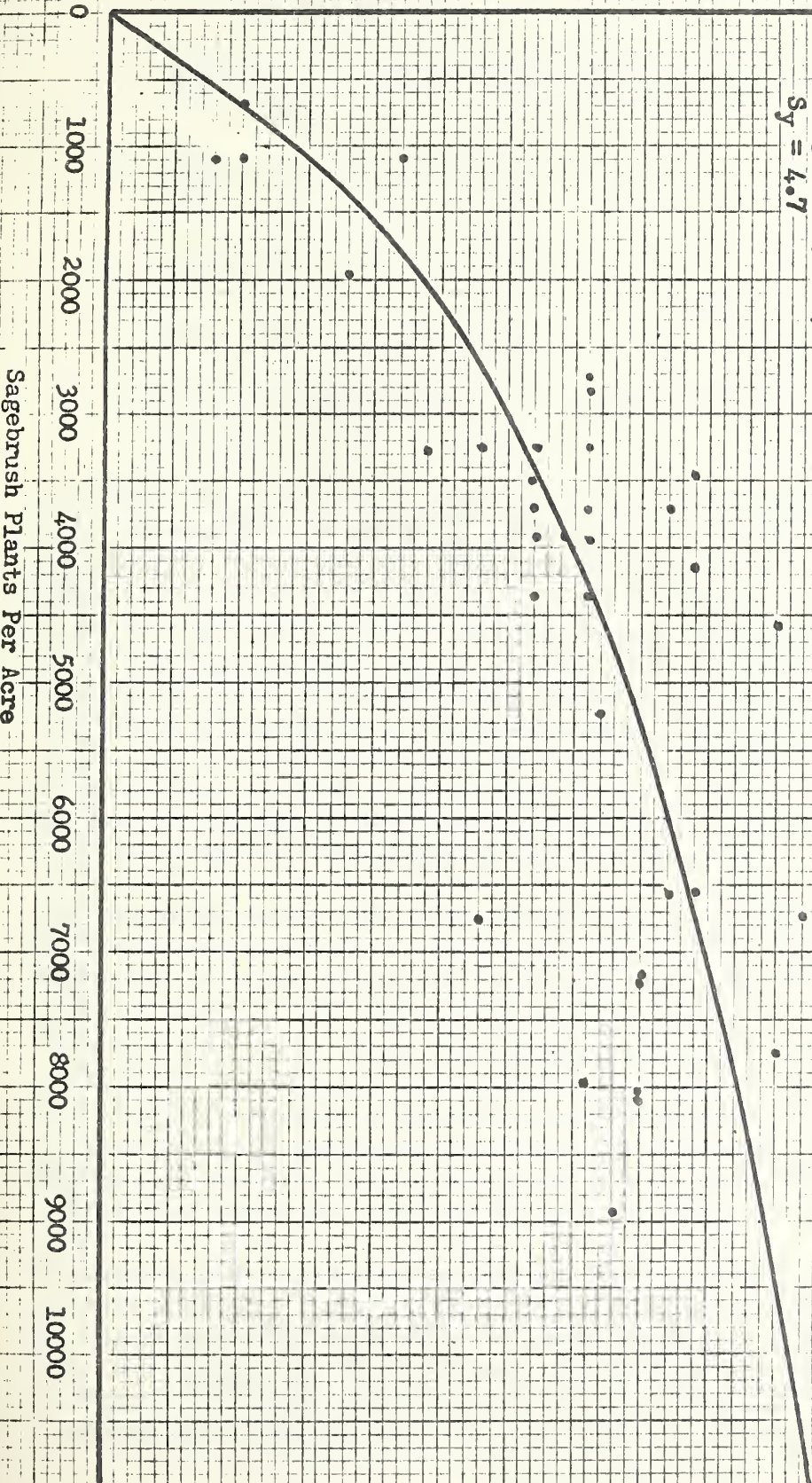
$r = 0.58$

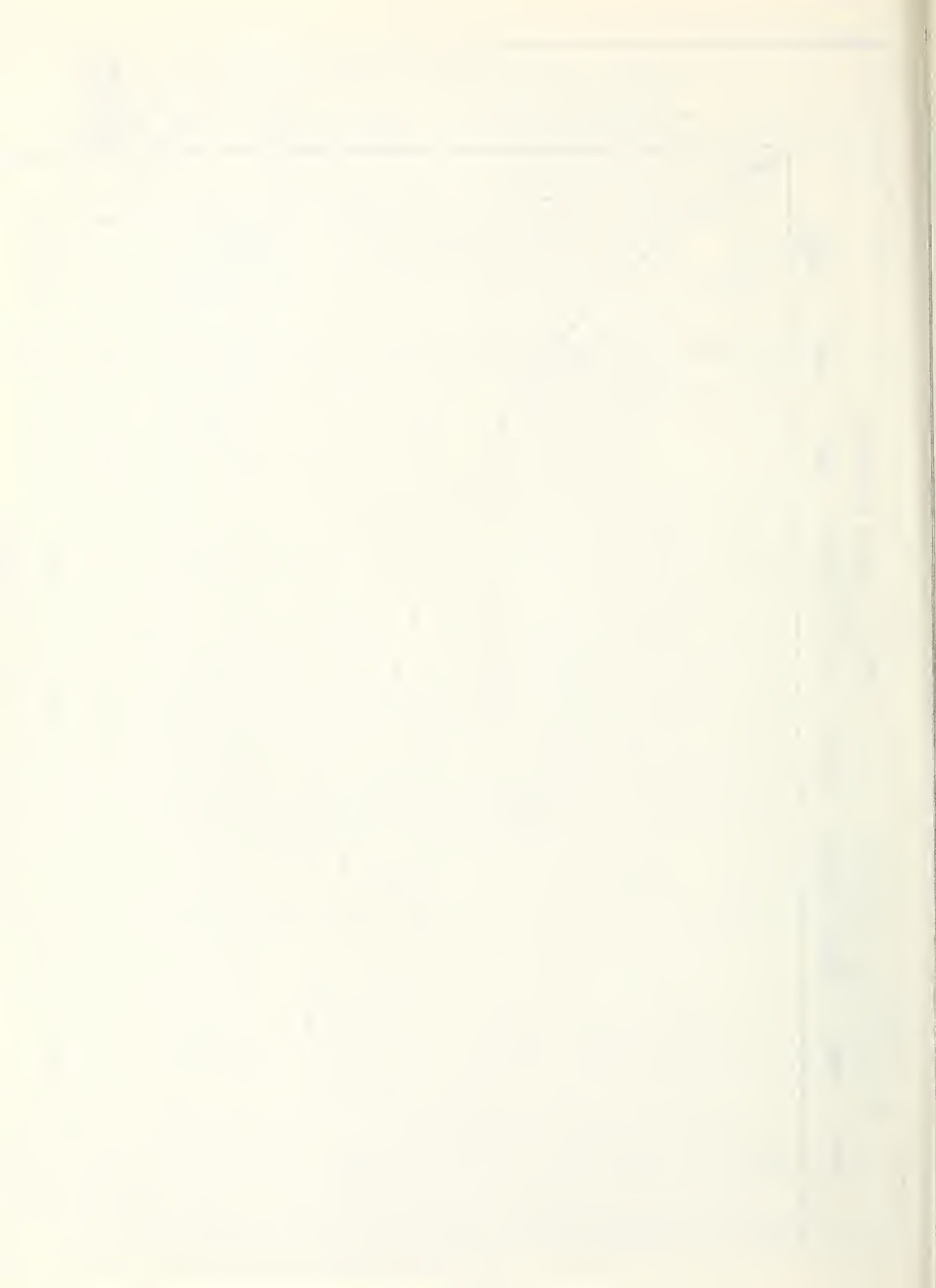
Range $X = 653 - 8930$

$S_x = 1962$

Range $Y = 4 - 24$

$S_y = 4.7$



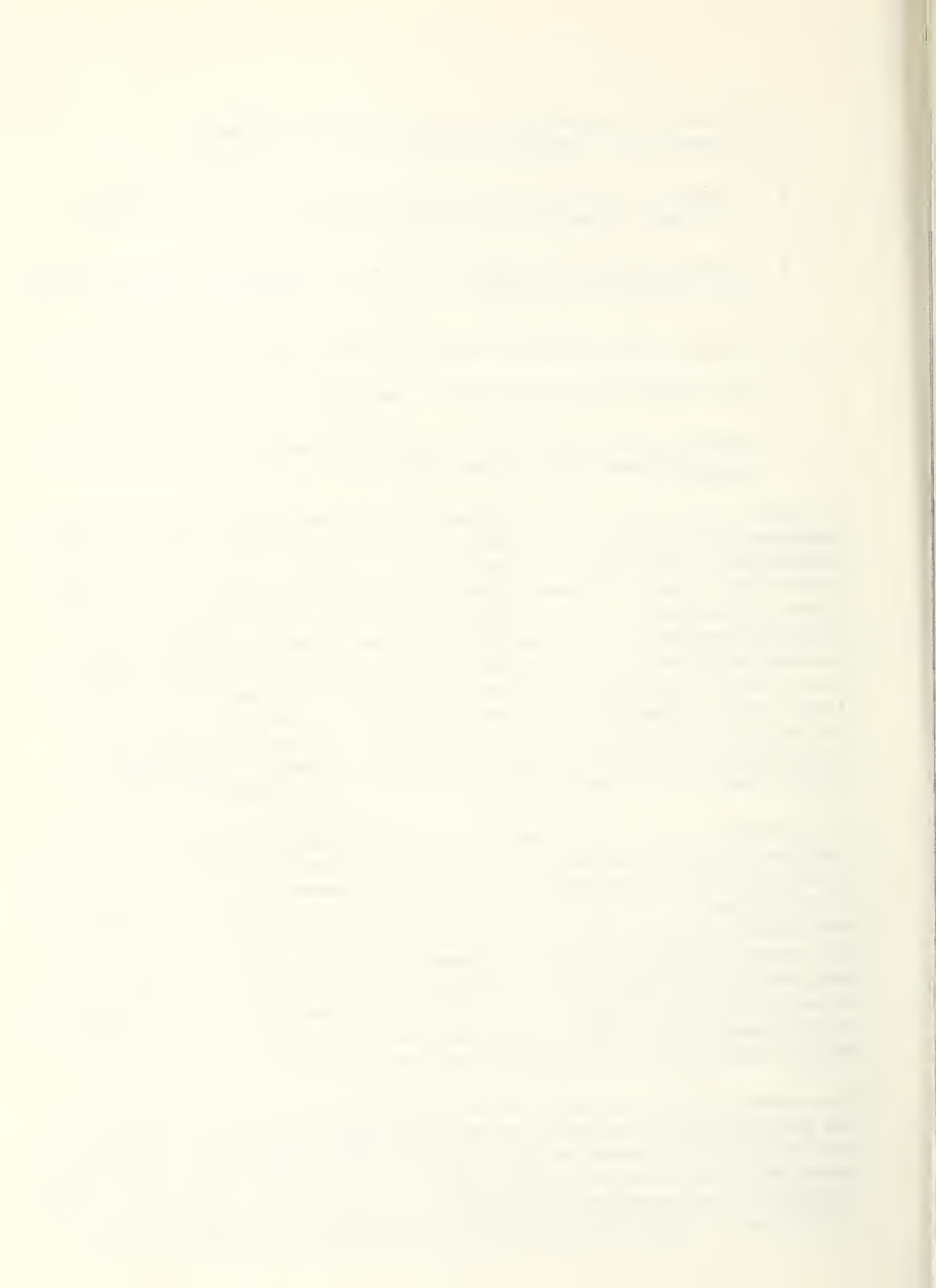


3. Dense mature stands with large, uniform crowns. Sites 5, 6, 11, 22, 25, 27, 37.
4. Sagebrush stands reestablishing following treatment - spray or roto-beat. Sites 13, 14, 19, 21, 34, 35.
5. Open stands with openings 5 to 15 feet in diameter and good understory of grasses and forbs. Sites 2, 4, 10, 12, 15, and 31.
6. Stands with numerous plants with small crowns. Sites 17 and 27.
7. Few mature plants with large, dense crowns. Sites 19 and 21.
8. Mixed stands of big and low sagebrush, generally open with Poa secunda understory. Sites 8 and 34.

In order to rate sagebrush stands for sage grouse habitat, optimum habitat conditions must be described. While these conditions have not been fully established, major habitat requirements are known. Summer sage grouse habitat must meet requirements for cover, food, and water. Cover, provided by sagebrush and other shrubs, should be dense enough to provide cover and food for the birds but should not be so dense that understory grasses and forbs are suppressed. Thus, the optimum habitat would be an open stand of sagebrush with a good understory of grasses and succulent forbs. Such a stand would also be most likely to support the insects so necessary for survival of young sage grouse. Of the site situations described above, No. 5 most nearly meets this standard. Analyzing the sites in category 5 shows 3400 plants per acre and 16 percent overstory.

The minimum cover requirements for summer sage grouse habitat is not definitely known; however, most authorities agree that around 800 sagebrush plants per acre are necessary to provide the needed cover and forage. The curve on Table 1 indicates that five percent overstory can be expected with 800 plants per acre. Thus, the minimum to optimum cover requirements for summer sage grouse habitat probably ranges between 5 and 15 percent. As overstory exceeds 15 percent, understory plants are suppressed, and at some point the sagebrush stand reaches a density that renders it unfit for sage grouse habitat. Where this point lies is not known, but it is probably beyond 6000 plants per acre and 20 percent overstory.

Thousands of acres of sagebrush have been sprayed with herbicides during the past decade as a means of increasing forage for domestic livestock. This has seriously damaged sage grouse habitat in many areas. However, there are indications that such damage is not permanent. Five of the sites sampled in this study had been treated with herbicides during the past five to ten years. Sagebrush mortality ranged between 90 and 100 percent.



Mortality on forb species is not known but undoubtedly was comparable to the mortality on sagebrush. Sagebrush overstory and number of plants per acre on the sprayed sites when sampled in 1967 were as follows:

Site No.	Sagebrush Plants Per Acre	Sagebrush Overstory Percent
13	1089	5
14	1960	9
19	1089	4
21	953	4
Average	1198	6

Minimum requirements for sage grouse habitat were met for both sagebrush plants per acre and percent sagebrush overstory. A characteristic of most sprayed sites was the abundance of yellowbrush. Because of this, total overstory on the sites was somewhat higher than indicated by the sagebrush overstory alone. There was no way to compare forb production before and after treatment, but with the possible exception of lupine and balsamroot, forbs were present on the sprayed areas in near normal amounts.

Two of the sites sampled had been roto-beaten some time during the past 15 to 20 years. These sites showed the following:

Site No.	Sagebrush Plants Per Acre	Sagebrush Overstory Percent
34	7187	20
35	3703	18
Average	5445	19

Both sites had recovered from treatment effects during the 16 to 20 years following treatment. With 7187 plants per acre and 20 percent overstory, the understory plants on Site 34 are no doubt being suppressed. Site 35 appears to be near optimum for both grouse and livestock production.

The objective of sagebrush spraying is to increase the amount of forage available to domestic livestock. This is accomplished by reducing herbage produced by sagebrush and increasing herbage produced by grasses. Some indication of the dominance of sagebrush in stands of varying overstory is shown in Table 4.

The table indicates that when sagebrush overstory is in the optimum range, 11 to 15 percent, sagebrush makes up 40 percent of the total production and average production amounts to 320 pounds per acre. As sagebrush overstory increases beyond 15 percent, the percentage of total production increases to approximately 50 percent and sagebrush production averages



Table 4. Percentage of total composition and pounds per acre produced by sagebrush at various levels of sagebrush overstory.
Data from 68 site analysis transects.

Sagebrush Overstory Percent	Percentage of Total Production Made Up By Sagebrush	Sagebrush Production Pounds Per Acre Airdry Weight
0 - 5	13	86
6 - 10	31	238
11 - 15	40	320
16 - 20	49	522
21 - 25	49	497

around 500 pounds per acre. From the multiple use standpoint it appears that the best procedure would be not to spray sagebrush stands where overstory is less than 15 percent, since such stands provide good habitat for sage grouse and at the same time are open enough to support good stands of grasses and forbs for domestic livestock use. Where sagebrush overstory exceeds 15 percent, spraying with herbicides will, in most cases, probably be desirable. Such stands do not provide optimum habitat conditions for sage grouse and the grass and forb understory is significantly suppressed by the sagebrush. In spraying these stands the object should not be the total elimination of sagebrush; rather it should be to reduce stand density to a level where sage grouse habitat is improved and forage production for domestic livestock is increased. Strip spraying must be used if this objective is to be reached. A better method would be to adjust the herbicide concentration so that only a partial kill - possibly 60 to 70 percent - on sagebrush results. Concentrations required to provide this degree of kill have not been established, but research on the subject would, no doubt, provide the answer.

- - - - -

Plan SAFETY for each operation.

- - - - -

Summer is the time the flies try for a SCREEN TEST.





)

)

)

)